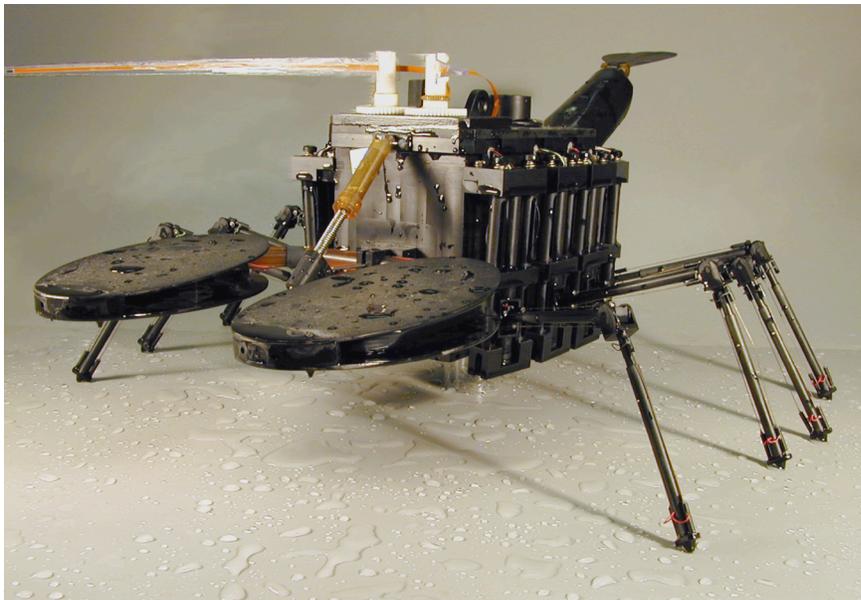


## **Biomimetic Underwater Robot Program**

### Vehicle Operational Scenario and Performance Goals

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BUR-001 Ambulatory Robot



BUR-002 Undulatory Robot

### **Description**

The **BUR-001** is an autonomous underwater ambulatory robot. It consists of an 8" by 5" hull actuated by eight three-degree of freedom legs and stabilized by anterior and posterior hydrodynamic control surfaces. It can be powered by either a rechargeable NiMH or lithium ion polymer battery pack and controlled a neuronal-circuit based controller. The proprietary controller implements a behavioral set reverse engineered from action sequences of lobsters adapting to the target search environment. The vehicle is designed for operation in shallow waters that feature current and surge.

The **BUR-002** is an undulatory robot is intended to complement the operation of the ambulatory robot to perform search operations for mine candidates that are suspended in the water column. These vehicles are based on a common biomimetic control, actuator and sensor architecture that features highly modularized components and low cost per vehicle. Operating in concert, they can conduct autonomous investigation of both the bottom and water column of the littoral zone or rivers. These systems represent a new class of autonomous underwater vehicles that may be adapted to operations in a variety of habitat

## BUR-001 Ambulatory Vehicle Specifications

### Dimensions

	Length	Width	Height	Weight	
Overall	24"	16"	5-10"	Air	8.5 lb
Claws	8"	4"		Water	3 oz.
Tail	8"	2:			

### Propulsion Mechanism

Omnidirectional walking mediated by three degree of freedom legs  
 Teflon insulated SMA wire (.006") Muscle Modules  
 6 Antagonistic muscle modules/leg  
 8 Bilaterally organized walking legs

### Competencies

#### Operational environment

Depth range: 0-50m.  
 Operational temperature: 15-25 C (subject to change - to be expanded).  
 Maximum operational current speeds: 100 cm/s.

#### Basic performance capabilities

Mission length: approx. Currently 1 hour with NiMH Rechargeable batteries. Should be increased 3 fold with Lithium ion Polymer Batteries.  
 Range: 700-1400m (depending on ambient flow conditions and temperature).  
 Maximum anticipated. forward speed: 10cm/s. Currently 5cm/sec.

## BUR-002 Undulatory Vehicle Specifications

### Dimensions

	Length	Width	Height	Weight	
Overall	36"	4:	4		
hull	8-12"	4"	4"	air	2-3 lbs.
body	24"	1.5"	1.5"	water	2-4 oz
tail	9"	1.5"	1.5"		

### Propulsion Mechanism

Lateral undulations propagating from rostral to caudal segments  
 Teflon insulated SMA wire (.006") Muscle Modules  
 2 Antagonistic modules/segment  
 8 Powered Segments

### Competencies

#### Operational environment

Littoral Zone, Depth range: 0-50ft.  
 Operational temperature: 15-25 C (subject to change - to be expanded).  
 Maximum operational current speeds: 10-15 cm/s.

#### Basic performance capabilities

Mission length: approx. 1.5h mission length (depending on ambient water temperature and flow environment).  
 Should be increased 3 fold with Lithium ion Polymer Batteries.  
 Maximum forward speed: 15cm/s